Engineering Review

WHEN the opera season in New York opened on December 24, occupants of the "Diamond Horeshoe" observed for the first time the results of the thorough remodeling and modernizing program which, carried out during the past summer and early fall, has effected sweeping improvements from the stage to the marquees of the historic Metropolitan Opera House. Most notable of the changes directly affecting the operatic productions is the installation of the most modern type of electron-tube control for both the stage and house lights.

This new lighting equipment will place the control of all lighting effects, including proportional dimming and scene-to-scene fading, at the finger tips of a lighting technician who will manipulate the numerous small levers and toggle switches of the master-pilot and presetting controllers located on the first level below stage. While so doing, he will be able to observe the lighting effects produced by looking through a hooded opening in the stage floor near the footlights. From this "lighting pit" each of the 156 circuits for the stage may be independently preset for three complete lighting scenes, so that the touch of a button will accomplish the scene-to-scene change of circuits. In addition, the 11 house circuits may be controlled from this point.

The presetting controller, located in the lighting pit, provides for the individual control of each circuit. The master controller is designed to simplify the work of the operator and is mounted at the end of this presetting controller at a convenient angle to facilitate manipulation while observing the effects from his raised platform. It enables him to govern all circuits simultaneously—either for dimming or for blackout—and to split the control into major divisions of color. The circuits are arranged to provide one color for the house and four colors for the stage, except for the footlights where five colors are to be used.

This type of theater lighting equipment, known as Thyratronreactor dimming control, is a development of the General Electric Company. This system, through the use of electron tubes, reduces the current consumption in the dimming equipment and eliminates the bulky backstage switchboards required by the resistance type of control. The master or pilot controllers of the new system are relatively compact and may, therefore, be placed beneath the front of the stage, enabling the lighting technician to see all details of the effects which he produces. The rest of the Thyratron-reactor equipment, including electron-tube panels, distribution panels, and reactors, is mounted on "remote racks" located in the sub-basement of the building.

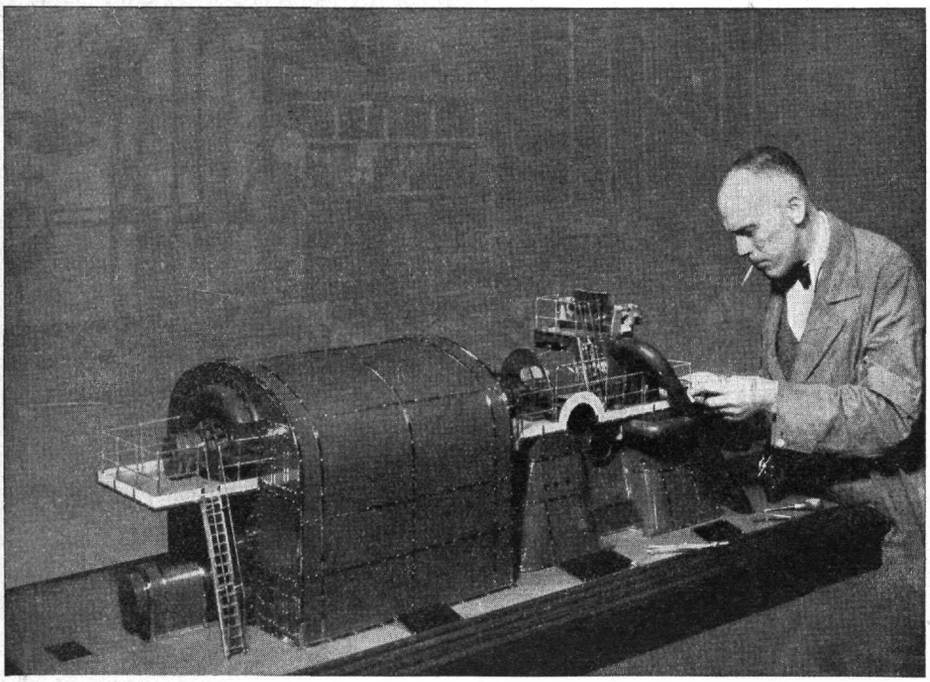
New Mercury Vapor Lights

The first street lighting installation in America incorporating high-intensity mercury vapor lights has been made in front of the new post office at Lynn, Mass., where eight of the units have been put in service by the Lynn Gas & Electric Company. To the casual observer the lighted units seem to differ little if any from the more usual bright lights found in white way lighting installations; but to the engineer the new units represent a decided advance in the lighting art, incorporating as they do an increase of approximately 50 per cent in the output of light of the complete unit.

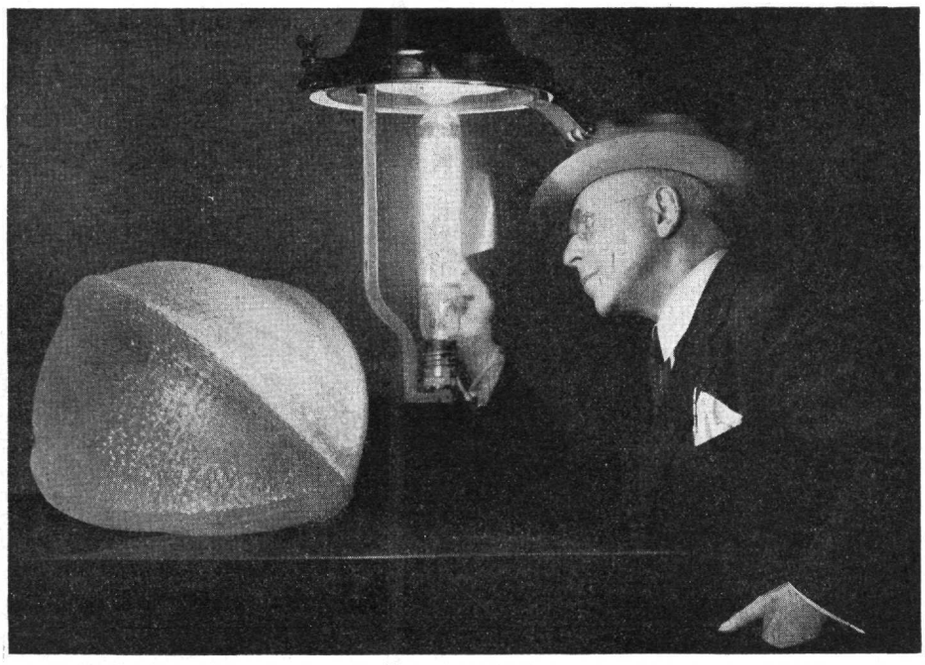
The units externally differ none from the usual ornamental street lighting globes. Within, however, are contained two lighting units—one of the new mercury vapor lamps and one of the usual incandescent lamps. The combination of the two types of light emitted by these radically different units, blended within the ornamental fixture, gives a white light that is ideal for heavy traffic thoroughfares and business sections of cities, where white way lighting is generally employed.

When the current is turned on, the mercury lamp at first glows with a relatively weak and decidedly greenish blue light; it is then operating at 20 volts and 5 amperes, as a low-intensity, low-pressure arc. The light then fills the inner bulb. Over several minutes the pressure is built up by the heat; the light output becomes more intense and whitish; and, when stable operation is attained, is at 155 volts. The light now is concentrated into a brilliant pencil-like beam extending the length of the inner bulb.

The incandescent lamp within the luminaire serves several purposes. Not only does it correct the color value so that more natural effects are obtained, but it supplies heat for starting the mercury lamp in cold weather. It also safeguards the location from outages which would result if mercury units alone were used; it is an inherent property of the mercury lamp that, energy having been cut off or a decided voltage drop encountered, it has a tendency not to restart until it has cooled.



Model of Huge Ford Turbine Generator



New Type Mercury Vapor Light and Globe

Another Giant Turbine

The Ford Motor Company is to add to its River Rouge power generating plant, at Fordson, Mich., a 110,000-kilowatt turbine generator that will be even more efficient than the similar one which was placed in service in the same station in 1930. The previous unit was the most modern steam turbine generator then conceived; the new one, which will incorporate several new engineering fatures, will be the first large unit anywhere in the world to operate at 1200 pounds pressure and 900 degrees Fahrenheit.

The new machine, like the first, is a vertical compound unit. The high-pressure turbine and generator will be mounted directly on top of the low-pressure turbine and generator. Each element has a capacity of 55,000 kilowatts, and generates at 1800 r.p.m.

As a result of using the high temperature, even less coal will be needed to produce a given electric output than in the case of its companion unit, which itself is notable for its high efficiency.

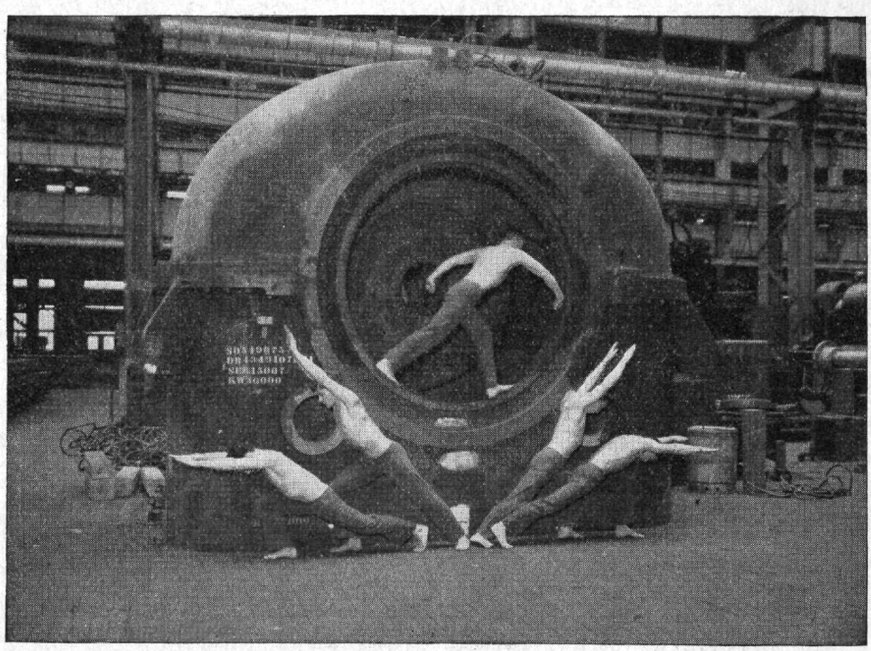
One of the important features of the vertical design—of particular value in the Ford plant, where floor space is at a premium—will be the small amount of space taken by the unit. The general dimensions will include a length of 57 feet 6 inches, a maximum width of 23 feet, and a little less than 21 feet overall height from the floor. The approximate weight will be 2,000,000 pounds. The space to be occupied will be less than a quarter of a cubic foot per kilowatt of output. Less than a pound of coal will be needed to generate a kilowatt-hour of electricity.

1934 Power Development

During the year 1934 a stupendous program of power development, flood control, water conservation, and navigation was carried on by the Government. It is estimated that this will increase the nation's power-producing capacity by 1,000,000 horse-power.

Work was started on two dams in the Columbia River in the Northwest. One of these is solely for power development while the other is a combined power and navigation project. The greatest concrete dam ever attempted by man, the Boulder Dam on the Colorado river, neared completion during the year. At Fort Peck, on the upper Mississippi River, the world's largest earth dam was under construction to regulate the flow of the Mississippi, and provide water for irrigation. Work was done on other dams for power, storage and irrigation purposes on the North Platte River, in Wyoming, the Clinch River and the Tennessee River in the Southeast. Plans were made for the construction of a dam at Pickwick Landing on the Tennessee River. The total cost of these works is estimated at 400,000,000 dollars.

In the field of transportation, streamlining of trains and automobiles held the spotlight. However England launched the Queen Mary, a giant liner 1,018 feet long, and France is building the Normandie, which is eleven feet longer. Like the British ship, the huge French liner will be the last word in safety, speed, and convenience. Air transportation kept abreast with a general extension of service. The London-Melbourne flight in October provided spectacular evidence of the performance of modern transports.



When Ted Shawn and his male dancers performed in Schnectady, N. Y., this summer, they paid a visit to the General Electric plant there. In the turbine shop Mr. Shawn was very much interested in the huge casing for a 30,000-watt turbine-generator as a background for a dance symbolic of power, and posed his dancers in this expressive arrangement. Mr. Shawn is shown in the center.